Title V

Model General Permit Template

SERIES 1 GAS TURBINES

Template # SJV-GT-1-1

≥ 10 MMBtu/hr heat input at peak load

with continuous emissions monitoring system (CEMS)

with water/steam injection

with selective catalytic reduction (SCR)

fired exclusively on P.U.C. quality natural gas

This template is designed to streamline the Title V permitting process for gas turbines meeting the above qualifications. Applicants for Title V permits choosing to use this template will only have to complete the enclosed template qualification form and submit it with their Title V application.

San Joaquin Valley Unified Air Pollution Control District

Title V Model General Permit Template
Series 1 Gas Turbines

Template No: SJV-GT-1-1

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SAN JOAQUIN VALLEY
UNIFIED AIR POLLUTION CONTROL DISTRICT

TITLE V GENERAL PERMIT TEMPLATE SJV-GT-1-1

ENGINEERING EVALUATION

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I. Purpose

The purpose of the proposed template is to streamline the Title V permitting process and reduce the time required by the applicant and the District by identifying the federally applicable requirements for certain gas turbines and establishing permit conditions which will ensure compliance with such requirements. These conditions will be incorporated into the Title V permit of any facility choosing to make use of the template.

II. Template Applicability

The template applies to any stationary gas turbine which:

Generates electricity and heat energy through the combustion of natural gas that contains no more than 0.017% sulfur by weight, and

Is a member of the class of gas turbines with heat input greater than 10 MMBtu/hr, and is not a General Electric Frame 7 with Quiet Combustor, and

Is served by Selective Catalytic Reduction and water injection to control NOx emissions.

The applicability of this template can best be established by answering the questions on the Template Qualification Form attached as Appendix E.

III. Applicable Requirements

Units may be subject to "federally enforceable" requirements as well as requirements that are enforceable by the "District-only". Federally enforceable requirements will be enforceable by the EPA and the public through Title V permit conditions identified as federally enforceable. District-only requirements represent local or state regulations for which the EPA has no direct enforcement authority. The final Title V permits issued by the District will contain both federally enforceable and District-only requirements.

District-only requirements are not addressed in this template except for those used in streamlining of multiple requirements (see discussion in section IV). District-only requirements used in streamlining of multiple requirements will become federally enforceable. Table 1, Applicable Requirements, does not necessarily include all federally enforceable requirements that apply to gas turbines qualifying to use this template, and it is the source's responsibility to determine any and all applicable requirements to which the source is subject. Generally, requirements not addressed by this template are those that require a source-specific analysis, or are covered by other templates.

Table 1. Applicable Requirements

Rule Category	Rule/Regulation	Citation	Description
A	County Rule	108[1]	Source Monitoring (CEMS)
A	County Rule	109[2]	Source Monitoring (CEMS)
A	County Rule	108.1[3]	Source Sampling
A	County Rule	110[4]	Source Sampling
A	County Rule	108[5]	Source Sampling
A	SJVUAPCD Reg. IV	4201 (SIP approval expected before permit issuance)	Particulate Matter Concentration
A	County Rule	404[4]	Sulfur Compounds
A	County Rule	406[6]	Sulfur Compounds
A	County Rule	407[7]	Sulfur Compounds
A	New Source Performance Stds Subpart GG	40 CFR §§ 60.332 through 60.335(e)	Standards for Performance of Stationary Gas Turbines
A	New Source Performance Stds. Subpart A	40 CFR §§ 60.7(b), (c), (d), (e) and (f), 60.8, 60.11 and 60.13	General Provisions - Excess Emission Reports, Conducting Performance Tests, Continuous Emission Monitor Requirements
A	SJVUAPCD Reg. II	2520, 9.4.2 and 9.5.2	Periodic Monitoring and Recordkeeping
B	SJVUAPCD Reg. II	2201	New Source Review Rule
B	SJVUAPCD Reg. II	2520	Federally Mandated Operating Permits
B	SJVUAPCD Reg. IV	4101	Visible Emissions
C	SJVUAPCD Reg. I	1080	Stack Monitoring
C	SJVUAPCD Reg. I	1081	Source Sampling
C	SJVUAPCD Reg. IV	4703 except Section 5.2	Stationary Gas Turbines

Category "A" rules contains requirements that are directly applicable to the qualifying units; compliance with these applicable requirements will be demonstrated in this engineering evaluation and assured by the template permit conditions. In section IV, Compliance, the federally-enforceable requirements from category "A" rules are listed with a discussion of how compliance with these requirements is achieved.

Category "B" rules contains federally enforceable requirements that were not addressed in this template. These may not be all of the federally enforceable

[1] Kings, Fresno, Merced, San Joaquin, Tulare, Kern, Stanislaus
[2] Madera
[3] Fresno, Merced, San Joaquin, Tulare, Kern, and Stanislaus
[4] Madera
[5] Kings
[6] Fresno
[7] Kings, Merced, San Joaquin, Tulare, Kern, and Stanislaus

requirements for this unit. Requirements from these rules must be addressed by the applicant outside of this template within the Title V application Compliance Plan form (TVFORM-004). Category "B" listing is included in this table as an informational item to assist applicants in this effort.

Category "C" rules are District rules, which are used to show compliance with federally enforceable requirements, and therefore will become federally enforceable through the use of this template.

IV. Compliance

This section contains a discussion of how compliance is assured with each requirement addressed in this template. Some requirements have been "streamlined", according to the procedures in EPA's White Paper #2 for Improved Implementation of the Part 70 Operating Permits Program (March 5, 1996).

District Rule 1080

District Rule 1080 has been submitted to EPA to replace each of the county rules in the SIP: Rule 109 (Madera) and Rule 108 (in all seven remaining counties in the San Joaquin Valley). Appendix A lists all of the applicable requirements of District Rule 1080 and shows which are included in the rule from each county. This table shows that District Rule 1080 is at least as stringent as the county SIP rules for Source Monitoring. A permit shield from each of these county rules is given in template permit condition #25.

Section 6.5 requires that a continuous emissions monitoring systems (CEMS) be installed at the request of the District and meet certain performance specifications. These performance specifications will be covered by conditions #19, #20, #30, #31, #33 and #34 on the Title V permit template.

Section 7.2 requires that CEMS data be reduced following specified procedures. These procedures are covered by template permit condition #19.

Section 7.3 requires records be maintained for at least two years and contain the occurrence and duration of any start-up, shut-down or malfunction, performance testing, calibrations and checks, adjustments, maintenance of CEMS, and emissions measurements. Maintenance of such records is required by template permit condition #20.

Section 8.0 requires a quarterly report be submitted to the District. Such a report is required by template permit condition #34.

Section 9.0 requires the owner or operator to report to the APCO the occurrence of any violation of emissions standards within 96 hours. Such a report is required by template permit condition #31.

Section 10 requires that the APCO be notified no later than eight hours after the detection of a breakdown of the CEMS. It also requires the operator to inform the APCO of the intent to shut down the CEMS at least 24 hours prior to the event. Such reporting is required by template permit condition #33.

District Rule 1081

District Rule 1081 has been submitted to the EPA to replace each of the county rules in the SIP: Rule 108 (Kings), 108.1 (Fresno, Merced, San Joaquin, Tulare, Kern and Stanislaus), and 110 (Madera). Appendix B lists all of the applicable requirements of District Rule 1081 and shows which are included in the rule from each county. This table shows that District Rule 1081 is more stringent than each of these county rules. A permit shield for each of these county rules is given in template permit condition #25.

Sections 3.0, 4.0, 5.0, 6.0, and 7.0 set forth requirements for sampling facilities, collection of samples, test methods, test procedures, and administrative requirements, respectively. These requirements are covered by template permit condition #8.

District Rule 4201

Section 3.1 requires emissions to be at or below 0.1 grains of particulate matter per dry standard cubic foot of exhaust gas. Compliance with the Particulate Matter (PM) emission limit of 0.1 gr/dscf is expected because the turbine is fired on PUC-quality (low sulfur) natural gas. Results from source tests of natural gas turbines in the San Joaquin Valley (see Appendix D) indicate emission rates of approximately 0.001 gr/dscf of PM.

Permit conditions will be added to require firing on PUC-quality natural gas exclusively, and to limit the maximum particulate emissions to 0.1 gr/dscf. (see template conditions #1 and #2). A permit shield will be granted for Rule 4201 through template permit condition #26.

Rules 402 (Madera) and 404 (in all seven remaining counties in the San Joaquin Valley) are replaced by Unified District Rule 4201. The above analysis shows compliance with all these rules, regardless of which are SIP approved at the time of permit issuance.

By using this template the applicant is requesting a permit shield from the requirements of Rules 402 (Madera) and 404 (in all seven remaining counties in the San Joaquin Valley). See permit shield condition #25.

40 CFR § 60.333(a), (b) and County Rule 404 (Madera), 406 (Fresno) and 407 (all six remaining counties in the San Joaquin Valley)

These requirements each contain limits on emissions of sulfur oxides (SO_x). The following analysis shows that the proposed requirement to burn PUC-quality natural gas is more stringent than each county's rule and/or 40 CFR Subpart 60. Streamlining procedures, as documented in the following steps, are utilized to substitute the proposed set of requirements for the otherwise applicable requirements.

Step 1. Side-by-side Comparison of Applicable Requirements:

SOx			
CITATION:	County Rule	Subpart GG	Proposed Requirements
WORK PRACTICE STDS.	none	Do not burn fuel which contains sulfur in excess of 0.8% by weight	Use PUC quality natural gas with a sulfur content of ≤ 0.017% by weight
EMISSION LIMIT	3.0 (2000 ppm), based on 15 minute averaging	60.333(a) (150 ppm) based on instantaneous averaging	none
MONITORING 1) PUC-regulated natural gas 2) non PUC-regulated natural gas	none	60.334(b) & 335(e) - daily fuel analysis for sulfur content, unless other frequency approved by the Administrator	1) If PUC-regulated, natural gas is monitored by PUC. 2) If non PUC-regulated, weekly fuel analysis for sulfur content. If (8) consecutive tests show compliance, then quarterly testing.
RECORDKEEPING 1) PUC-regulated natural gas 2) non PUC-regulated natural gas	none	none	1) PUC-regulated fuel, maintain copies of fuel invoices. 2) Non PUC-regulated, maintain copies of quarterly SOx testing results.
REPORTING	none	60.334(c)(2)	none
TEST METHODS	EPA 8	EPA 20	ASTM Method D-1072-80, D3031-81, D4084-82, or D3246-81

Step 2. Select most stringent emission limit or performance standard:

The SOx emission limit of 150 ppmv is the maximum allowed by NSPS Subpart GG, and is clearly more stringent than the 2000 ppmv limit imposed by each county's rule. Because use of this template is limited to units that combust natural gas with a sulfur content ≤ 0.017% S by weight (PUC-quality, see Appendix C), compliance is assured with the 60.333(a) emission limit of 150 ppmv SO_2 (dry std. conditions at 15% O_2) 60.333(b) fuel sulfur limit of 0.8% by weight, and each county's rule SOx emission rate limit of 2000 ppmv. Therefore, as demonstrated

below, the proposed requirements under this template assure compliance with all otherwise applicable requirements.

Compliance with SOx Emission Concentration Limit - 60.333(a):

The combustion equation is (neglecting NO_X and SOx relative to O_2 in the exhaust):

$CH_4 + (2+X)O_2 + (2+X)3.78N_2 + YS >> CO_2 + 2\ H_20 + XO_2 + Y\ S0_2 + (2+X)3.78N_2$

where

Y = moles of sulfur in the fuel
X = moles of excess air

solving an expression for the fraction of O_2 in the exhaust by volume gives:

$$\frac{X}{3+X+(2+X)3.78} = 0.15 \Rightarrow X = 5.597$$

where

3 = combined total moles of CO_2 and H_2O in the exhaust
0.15 = fraction of O_2 in the exhaust by volume

solving for Y in an expression for the fraction of SO_2 in the dry exhaust by volume gives:

$$\frac{Y}{1+5.597+28.717} = 0.00015 \Rightarrow Y = 0.00530$$

where

Y = mole fraction of SO_2 per mole of CH_4 combusted
28.717 = moles of N_2 in the exhaust
0.00015 = 150 ppmv SOx emission limit

Use Y to calculate the weight fraction of S in 1 mole of CH_4:

$$\frac{(0.0053)(32.06)}{16.04+(0.0053)(32.06)} = 0.0105 \Rightarrow 1.05\%$$ S by weight in the fuel

where

32.06 = molecular weight of sulfur (S)
16.04 = molecular weight of CH_4
0.0105 = fraction of S by weight in the fuel

The preceding calculations show that a fuel sulfur content of 1.05% by weight yields 150 ppmv SO_x. Because the fuel is the only source of sulfur, the weight percent of sulfur in the fuel is proportional to the exhaust SO_2 concentration; therefore the exhaust SO_2 concentration associated with combustion of fuel with 0.017% sulfur is 2.4 ppmvd.

Compliance with 150 ppmv SO_x at 15% excess O_2 and dry standard conditions and 2000 ppmv is assured because all units covered by this template have a fuel sulfur concentration $\leq$ 0.017.

Compliance with Sulfur Fuel Content Limit - 60.333(b):
Natural gas which meets the quality standards of the Public Utilities Commission (PUC) contains less than 0.017% sulfur by weight which assures compliance with the 0.8% sulfur by weight limit of New Source Performance Standard, Subpart GG - 40 CFR Subpart 60.333. All natural gas that is regulated enters the PUC pipeline for distribution to consumers and is tested to assure that its composition conforms to this standard. Natural gas that is not regulated by the PUC must be monitored for sulfur in natural gas as specified in section 40 CFR 60.334(b) and tested as required in 60.335(e).

By General Order 58-A of the PUC (see Appendix C), natural gas which is supplied by any gas utility must contain less than or equal to 5 grains of total sulfur per 100 standard cubic feet. All natural gas that enters the PUC pipeline for distribution to consumers is tested to assure that its composition conforms to these standards. This standard can be converted to an expression of weight percent of sulfur in the natural gas (ng):

$$\%S\ (\text{lb S/lbng}) = \frac{5\ \text{gr}}{100\ \text{scf}} \left| \frac{1\ \text{lb}}{7000\ \text{gr}} \right| \frac{24.45\ \text{L}}{\text{mol ng}} \left| \frac{1\ \text{mol ng}}{16\ \text{g}} \right| \frac{454\ \text{g}}{1\ \text{lb}} \left| \frac{0.035\ \text{scf}}{1\ \text{L}} \right| 100$$

= 0.017% sulfur

0.017 sulfur by weight assures compliance with the 0.8% sulfur by weight limit of New Source Performance Standard, Subpart GG - 40 CFR Subpart 60.333(b).

Step 3. Conditions ensuring compliance with applicable requirements.

Template condition #1 requires turbines to use PUC quality natural gas with a sulfur content less than or equal to 0.017% by weight. In addition, conditions #9, #10 require testing, condition #21 requires monitoring and #32 requires reporting to assure compliance with the streamlined sulfur oxide emission limit.

Step 4. Certify compliance

By using this template as part of the title V application, the applicant is certifying compliance with all conditions required as part of the template.

Step 5. Compliance schedule for new monitoring requirements

Not applicable.

Step 6. Request for permit shield

By using this template the applicant is requesting a permit shield from the requirements of Rule 406 (Fresno), Rule 407 (Kern), Rule 404 (Madera), Rule 407 (Tulare), Rule 407 (Kings), Rule 407(Stanislaus), Rule 407 (Merced), Rule 407 (San Joaquin)and subpart GG of 40 CFR that pertains to SOx emissions. See template condition #26.

40 CFR § 60.332(a), (b) - Subpart GG

This requirement limits emissions of nitrogen oxides. Emissions shall not exceed a NOx emission rate of 75 ppmvd or 150 ppmv, depending on the unit size (at 15% O_2 with the ISO correction factor). The following analysis shows that the proposed requirement to burn PUC-quality natural gas is more stringent than 40 CFR requirements pertaining to NOx emissions. Streamlining procedures, as documented in the following steps is utilized to substitute the proposed set of requirements for the otherwise applicable requirements.

Step 1. Side-by-side Comparison of Applicable Requirements:

NOx		
CITATION:	Subpart GG	Proposed Requirements
WORK PRACTICE STDS.	The water-to-fuel ratio to achieve compliance with the NOx limit shall be determined at different loads. (60.335(c)(2))	Use PUC quality natural gas.
EMISSION LIMIT 1) <10 MW 2) ≥10 MW	60.332(a) (75 ppm)	1) If < 10 MW then 42 ppm @ 15% O_2 2) If ≥ 10 MW then (9 X EFF/25) ppm @ 15% O_2 where EFF (efficiency) is the higher of EFF1 or EFF2 below: $EFF1 = \frac{3412\ Btu/kW\text{-}hr}{Actual\ Heat\ Rate\ at\ HHV\ (Btu/kW\text{-}hr)} X\ 100\%$ $EFF2 = EFFmfr\ x \left(\frac{LHV}{HHV}\right)$ where actual heat rate is a ratio of the heat input to power output taking into account the manufacturer's listed turbine efficiency, HHV is the higher heating value of the fuel, LHV is the lower heating value of the fuel, and EFFmfr is the manufacturer's continuous rated percent efficiency of the gas turbine with air pollution control equipment at LHV. An EFF < 25 shall be assigned a value of 25. [4703, 5.1]
MONITORING	The water-to-fuel ratio shall be continuously monitored, (60.334(a)) Conduct performance tests within 180 days of initial startup (60.8(a)) Performance testing procedures of 40 CFR 60.8 Standards for CEMS operation pursuant to 60.7(c) & 60.13 Monitor nitrogen content of the fuel. (60.334(b))	Operator shall install, operate and maintain in calibration a system which continuously measures and records: control system operating parameters, elapsed time of operation, and the exhaust gas NOx concentration at 15% O_2 on a dry basis. [4703, 6.2.1] Comply with District Rule 1080 (Standards for CEMS operation) [4703, 6.2.1.3]
RECORDKEEPING	None	Operator shall maintain a stationary gas turbine system operating log that includes, on a daily basis, the actual local time start-up and stop time, length and reason for reduced load periods, total hours of operation, type and quantity of fuel used. Maintain all records for two years. [4703, 6.2.4]
REPORTING	Report any one hour period when the water-to-fuel ratio falls below that determined to demonstrate compliance. (60.334(c)	
TESTING	Determine the nitrogen content of the fuel being fired. Use EPA Method 20 to determine NOx concentrations. 60.335(a),(b))	Test Annually for nitrogen oxides (NOx) concentrations shall be determined using EPA Method 20 or 7E and oxygen (O_2) using Method 3, 3A, or 20. [4703, 6.3, 6.4] Rule 1081 (additional source test requirements)

Step 2. Select most stringent emission limit or performance standard:

The proposed template requirement to use PUC-quality natural gas coupled with the proposed NOx emission limit of 42 ppm for turbines with a rating of less than 10 MW, and (9 X EFF/25) for turbines with a rating of 10 MW or larger, are clearly more stringent than the Subpart GG emissions limit of 75 ppmv as discussed below. According to Subpart GG of NSPS, the NO_X emissions must not exceed 75 or 150 ppmvd, corrected to standard ISO pressure, temperature and humidity using the ISO correction factor (40 CFR Part 60.332(a), (b)). The ISO correction factor may increase

the NO_X emission concentration from the measured value. The template requires NO_X emissions to be below (9 x EFF/25) ppmvd without ISO correction. Even with ISO correction the proposed NOx requirement is more stringent than subpart GG.

The ISO Correction Factor

CFR §60.335(c)(1) requires the following corrections:

$$NO_X = (NO_{XO}) \times \left(\frac{Pr}{Po}\right)^{0.5} \times e^{19(Ho-0.00633)} \times \left(\frac{288° K}{T_a}\right)^{1.53}$$

where:

- NO_X is the NO_X emission rate at 15% O_2 and ISO standard conditions, ppmvd
- NO_{X0} is observed NO_X concentration, ppmvd.
- Pr is reference combustor inlet absolute pressure.
- Po is observed combustor inlet absolute pressure.
- Ho is observed humidity of ambient air, g H_2O per g air
- e is transcendental constant, 2.719.
- T_a is ambient temperature, °K

The table below shows the ISO correction factor at various relative humidities throughout the ambient temperature range between 10 degrees and 130 degrees Fahrenheit.

Relative Humidity (%)	ISO Correction Factor(%)	
	Minimum	Maximum
0	82.74	121.67
10	82.22	**129.08**
20	81.71	129.07
30	81.20	129.06
40	80.68	129.05
50	80.17	129.04
60	79.65	129.03
70	79.14	129.02
80	78.63	129.01
90	78.11	129.00
100	77.60	128.99

Over the range of possible temperatures, pressures, and relative humidities in the San Joaquin Valley, the maximum ISO correction factor is 1.291. Assuming a maximum possible turbine efficiency of 45%, the maximum emission level allowed for a turbine with a rating of 10 MW or greater by the template, (9 x EFF/25) ppmvd, when corrected with the maximum ISO correction factor, is 20.9 ppmvd. The maximum emission level for a turbine with a rating of less than 10 MW is 54 ppmvd. Both of these values are less than the 75 or 150 ppmvd NOx allowed by Subpart GG. The proposed requirements for NOx are the same as the requirements of SJVUAPCD Rule 4703 (as amended October 16, 1997), sections 5.1, 6.2.1, 6.2.2, 6.2.4, 6.3, and 6.4. A permit shield is granted for these requirements in template permit condition #27.

Step 3. Conditions ensuring compliance with applicable requirements.

The units qualifying to use the template shall be required by permit condition to comply with the streamlined NOx emissions limit excluding periods of thermal destabilization or reduced load periods and associated monitoring, recordkeeping, reporting and testing on the date committed to on the template qualification form. Thermal destabilization is defined in District Rule 4703 (as amended October 16, 1999) as the start up or shut down time necessary to bring the heat recovery steam generator to the proper temperature, not to exceed two hours. Reduced load period is defined in District Rule 4703 as the time during which a gas turbine is operated at less than rated capacity in order to change the position of the exhaust gas diverter gate, not to exceed one hour. See template permit conditions #3 (emission limit), 8, 12 - 15 (testing requirements), 19, 20, 22 - 24 (recordkeeping), 29 and 30 (monitoring), and 31-34 (reporting). Until the date committed to in the template qualification form, the units qualifying to use the template shall be required by permit condition to comply with the NOx limits of 40 CFR 60.332 and associated monitoring, reporting and testing. See template permit conditions #4, 8, 16, 17, and 18.

Step 4. Certify compliance

By using this template as part of the Title V application, the applicant is certifying compliance with all conditions required as part of the template.

Step 5. Compliance schedule for new monitoring requirements

Not applicable.

Step 6. Request for permit shield

By using this template the applicant is requesting permit shield from the requirements of Subpart GG of 40 CFR that pertain to NOx emissions as of the compliance date committed to in the template qualification form. See permit shield condition #28.

<u>40 CFR 60.7(c), 60.8, 60.13</u>
These regulations contain requirements for reporting of excess emissions (60.7), conducting performance tests (60.8), and performance standards for CEMS (60.13). These requirements are subsumed within the monitoring, recordkeeping, and reporting requirements associated with the streamlined NOx requirements given in conditions #8, 12, 19, 20, 23, 24 30, 31, 33 and 34.

<u>District Rule 2520, 9.5.2</u>
Section 9.5.2 requires all records be maintained for at least five years. Template permit condition # 22 requires that all records be maintained for at least five years.

V. Permit Shield

A permit shield legally protects a facility from enforcement of the shielded regulations when a source is in compliance with the terms and conditions of the Title V permit. Compliance with the terms and conditions of the Title V permit is considered compliance with all applicable requirements upon which those conditions are based, including those that have been subsumed. A permit shield is requested in template permit conditions #25-28.

VI. Permit Conditions

The following conditions will be incorporated into the Title V permit of any facility choosing to make use of template #SJV-GT-1-1.

1. Unit shall be fired exclusively on PUC-quality natural gas which has a sulfur content of less than or equal to 0.017% by weight. [40 CFR 60.333(a) & (b); 60.332(a); Rule 404 (Madera), 406 (Fresno) and 407 (6 remaining counties in the San Joaquin Valley)][8]

2. Operator shall not discharge into the atmosphere combustion contaminants (PM) exceeding in concentration at the point of discharge, 0.1 gr/dscf. [District Rule 4201; Rule 402 (Madera) and 404 (all 7 remaining counties in the San Joaquin Valley)][8]

3. As of (Rule 4703 compliance date), operator shall not exceed a NOx emission rate of:

A. If Rating <10 MW,

42 ppmvd @ 15% O_2, excluding the thermal stabilization periods or reduced load periods.[9]

B. If Rating $\geq$ 10 MW,

(9 X EFF/25) ppmvd @ 15% O_2, under load conditions, excluding thermal stabilization periods or reduced load periods, where EFF (efficiency not considering downstream energy recovery) is the higher of EFF1 or EFF2 below:

[8] Emission Limits Effective Upon Permit Issuance
[9] Additional emission limits effective 8/18/1998-8/18/2000 (Depending on the compliance date committed to in the template qualification form)

$$EFF_1 = \frac{3412 \text{ Btu / kW - hr}}{\text{Actual Heat Rate at HHV (Btu / kW - hr)}} \text{ X } 100\%$$

$$EFF_2 = EFF_{mfr} \text{ x } \left(\frac{LHV}{HHV}\right)$$

where actual heat rate is a ratio of the heat input to power output taking into account the manufacturer's listed turbine efficiency, HHV is the higher heating value of the fuel, LHV is the lower heating value of the fuel, and EFF_{mfr} is the manufacturer's continuous rated percent efficiency of the gas turbine with air pollution equipment at LHV.
An EFF that is less than 25 shall be assigned a value of 25. [40 CFR 60.332(a)(1) & 60.332(a)(2) and District Rule 4703,5.1.1][9]

4. Reduced Load Period shall be defined as the time during which a gas turbine is operated at less than rated capacity in order to change the exhaust gas diverter gate not exceeding one hour. [District Rule 4703, 3.16]

5. Thermal Stabilization Period shall be defined as the start up or shut down time necessary to bring the heat recovery stream generator to proper temperature, not exceeding two hours. [District Rule 4703, 3.21]

6. Until (Rule 4703 compliance date), permittee shall not exceed a NO_x emission rate of 75 ppmvd (at 15% O2) corrected to ISO standard conditions.[40 CFR 60.332(a)][10]

7. Until (Rule 4703 compliance date), emissions in excess of 75 ppmvd NOx (at 15% O_2) during periods of startup, shutdown, and malfunction shall not be considered a violation of the NOx emission standard. [40 CFR 60.8(c)][10]

8. Operator shall be required to conform to the compliance testing procedures described in District Rule 1081. [Rule 108.1 (Fresno, Merced, San Joaquin, Tulare, Kern, and Stanislaus), Rule 110 (Madera), and Rule 108 (Kings); District Rule 1081][11]

9. If the turbine is not fired on PUC-regulated natural gas, then the sulfur content of the natural gas being fired in the turbine shall be determined using ASTM method D 1072-80, D 3031-81, D 4084-82 or D 3246-81. [40 CFR 60.335(d)][11]

10. If the turbine is not fired on PUC-regulated natural gas, the sulfur content of each fuel source shall be tested weekly except that if compliance with the fuel sulfur content limit has been demonstrated for 8 consecutive weeks for a fuel

[10] Additional emission limits effective only until 8/18/1998-8/18/2000 (Depending on the compliance date committed to in the template qualification form)
[11] Testing effective upon permit issuance

source, then the testing frequency shall be quarterly. If a test shows noncompliance with the sulfur content requirement, the source must return to weekly testing until eight consecutive weeks show compliance. [40 CFR 60.334(b)(2)][11]

11. The HHV and LHV of the fuel shall be determined using ASTM D3588-91, ASTM 1826-88, OR ASTM 1945-81. [40 CFR 60.332(a),(b) and District Rule 4703, 6.4.5][11]

12. As of (Rule 4703 compliance date), nitrogen oxides (NO_x) emissions shall be calculated using EPA Method 7E or 20, and oxygen (O_2) emissions shall be calculated using EPA Method 3, 3A, or 20. [40 CFR 60.335(b) and District Rule 4703, 6.4][12]

13. As of (Rule 4703 compliance date), the operator shall provide source test information annually regarding the exhaust gas NOx concentration corrected to 15% O_2 (dry). [40 CFR 60.332(a),(b) and District Rule 4703, 5.1][12]

14. As of (Rule 4703 compliance date), the operator shall provide source test information annually regarding the demonstrated percent efficiency (EFF) as defined in District Rule 4703, 5.1.1. [40 CFR 60.332(a),(b) and District Rule 4703, 5.1.1][12]

15. As of (Rule 4703 compliance date), any gas turbine with an intermittently operated auxiliary burner shall demonstrate compliance with the auxiliary burner both on and off. [40 CFR 60.335(b) and District Rule 4703, 6.3.2][12]

16. Until (Rule 4703 compliance date), the operator shall provide source test information annually regarding the exhaust gas NOx concentration corrected to 15% O_2 (dry) [District Rule 2520, 9.4.2][13]

17. Until (Rule 4703 compliance date), nitrogen oxides (NO_x) and oxygen (O_2) emissions shall be calculated using EPA Method 7E and 20. If EPA Method 20 is used, the span values shall be 300 ppm of NOx and 21 percent O_2. [40 CFR 60.335(c)(2),(3)][13]

18. Until (Rule 4703 compliance date), operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a NO_x performance test nor shall NO_x emissions in excess of the level of the emission limit shown in this permit during periods of startup, shutdown, and

[12] Additional testing effective 8/18/1998-8/18/2000 (Depending on the compliance date committed to in the template qualification from)

[13] Testing requirement only until 8/18/1998-8/18/2000 (Depending on the compliance date committed to in the template qualification form)

malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard. [40 CFR 60.8(c)][13]

19. Results of continuous emissions monitoring must be reduced according to the procedure established in 40 CFR, Part 51, Appendix P, paragraphs 5.0 through 5.3.3, or by other methods deemed equivalent by mutual agreement with the District, the ARB, and the EPA. [Rule 108 (Kings, Fresno, Merced San Joaquin, Tulare, Kern, and Stanislaus) and Rule 109 (Madera); District Rule 1080, 7.2][14]

20. Records shall be maintained and shall contain: the occurrence and duration of any start-up, shutdown or malfunction, performance testing, evaluations, calibrations, checks, adjustments, any periods during which a continuous monitoring system or monitoring device is inoperative, maintenance of any CEM's that have been installed pursuant to District Rule 1080, and emission measurements. [Rule 108 (Kings, Fresno, Merced San Joaquin, Tulare, Kern, and Stanislaus) and Rule 109 (Madera);District Rule 1080, 7.3; 40 CFR 60.7 (b)][14]

21. If the turbine is fired on PUC-regulated natural gas, then maintain on file copies of natural gas bills. [District Rule 2520, 9.4.2][14]

22. The operator of a stationary gas turbine system shall maintain all records of required monitoring data and support information for inspection at any time for a period of five years. [District Rule 2520, 9.5.2][14]

23. Results of continuous emission monitoring must be averaged in accordance with the requirements of 40 CFR 60.13. [40 CFR 60.334(a),(b),(c) and District Rule 4703, 5.0][15]

24. Operator shall maintain a stationary gas turbine operating log that includes, on a daily basis the actual local start-up and stop time, length and reason for reduced load periods, total hours of operation and quantity of fuel used. [40 CFR 60.332(a),(b) and District Rule 4703, 6.2.4][15]

25. Compliance with permit conditions in the Title V permit shall be deemed compliance with the following subsumed requirements: 40 CFR 60.333 (a) and (b); 60.334(a),(b), and (c)(1); Rules 402 (Madera) and 404 (Fresno, Kern, Kings, San Joaquin, Stanislaus, Tulare, Merced); Rule 108.1 (Kings) and Rule 108 (in all seven remaining counties in the San Joaquin Valley); Rule 108 (Kings), 108.1 (Fresno, Merced, San Joaquin, Tulare, Kern and Stanislaus), and 110 (Madera); SJVUAPCD Rule 4703 (as amended 10/16/93), Section 6.2.2 and 1080, 7.3. A permit shield is granted from these requirements. [District Rule 2520, 13.2][16]

[14] Recordkeeping effective upon permit issuance

[15] Additional recordkeeping effective 8/18/1998-8/18/2000 (Depending on the compliance date committed to in the template qualification form)

26. Compliance with permit conditions in the Title V permit shall be deemed compliance with the following applicable requirements: SJVUAPCD Rule 4201, 1081 and 1080, Sections 6.5, 7.2, 8.0, 9.0, and 10.0; Rule 404 (Madera), 406 (Fresno), 407 (Kings, San Joaquin, Merced, Stanislaus, Tulare, and Kern); 40 CFR 60.332(c) and (d); 60.334(b) and (c)(2); 60.335(d). A permit shield is granted from these requirements. [District Rule 2520, 13.2][16]

27. As of (Rule 4703 compliance date), compliance with permit conditions in the Title V permit shall be deemed compliance with the following applicable requirements: SJVUAPCD Rule 4703 (as amended 10/16/97) sections 5.1.1, 6.2.1, 6.2.4, 6.3, 6.4.1, 6.4.3, 6.4.5, and 6.4.6. A permit shield is granted from these requirements. [District Rule 2520, 13.2][16]

28. As of (Rule 4703 compliance date), compliance with permit conditions in the Title V permit shall be deemed compliance with the following subsumed requirements: Rule 404 (Merced); 40 CFR 60.332(a), (b); 60.335(a), (b), (c), and (e). A permit shield is granted from these requirements. [District Rule 2520, 13.2][17]

29. Operator shall install, operate and maintain in calibration a system which continuously measures and records: control system operating parameters, elapsed time of operation, the exhaust gas NO_x and O_2 concentrations. [40 CFR 60.334(a),(b)][17]

30. The continuous NO_x monitoring system shall meet the performance specification requirements in 40 CFR 60, Appendix F, 40 CFR 51, Appendix P, and Part 60, Appendix B, or shall meet equivalent specifications established by mutual agreement of the District, the ARB, and the EPA. [Rule 108 (Kings, Fresno, Merced San Joaquin, Tulare, Kern, and Stanislaus) and Rule 109 (Madera) and District Rule 1080, 6.7][18]

31. A violation of NOx emission standards indicated by the NOx CEM shall be reported by the operator to the APCO within 96 hours. [Rule 108 (Kings, Fresno, Merced San Joaquin, Tulare, Kern, and Stanislaus) and Rule 109 (Madera) and District Rule 1080, 9.0][18]

32. Operator shall submit a semiannual report listing any daily period during which the sulfur content of the fuel being fired in the gas turbine exceeds 0.8% by weight. [40 CFR 60.334(c)(2)][19]

[16] Additional permit shield effective 8/18/1998-8/18/2000 (Depending on the compliance date committed to in the template qualification form)
[17] Monitoring effective upon permit issuance
[18] Reporting effective upon permit issuance

33. Operator shall notify the APCO no later than eight hours after the detection of a breakdown of the CEM. Operator shall inform the APCO of the intent to shut down the CEM at least 24 hours prior to the event. [Rule 108 (Kings, Fresno, Merced San Joaquin, Tulare, Kern, and Stanislaus) and Rule 109 (Madera) and District Rule 1080, 10.0][19]

34. Operators of CEM's installed at the direction of the APCO shall submit a written report for each calendar quarter to the APCO. The report is due on the 30th day following the end of the calendar quarter and shall include:

A. time intervals, data and magnitude of excess emissions, nature and cause of excess (if known), corrective actions taken and preventive measures adopted;

B. averaging period used for data reporting corresponding to the averaging period specified in the emission test period used to determine compliance with an emission standard;

C. applicable time and date of each period during which the CEM was inoperative (except for zero and span checks) and the nature of system repairs and adjustments;

D. a negative declaration when no excess emissions occurred.[19]

[Rule 108 (Kings, Fresno, Merced San Joaquin, Tulare, Kern, and Stanislaus) and Rule 109 (Madera) and District Rule 1080, 8.0]

APPENDIX A

COUNTY RULE / DISTRICT RULE 1080 COMPARISON

APPENDIX A

Rule 1080 (Source Monitoring - CEMS)

REQUIREMENTS	1080 SJVUAPCD	108 KINGS	109 MADERA	108 FRESNO	108 MERCED	108 S.J.	108 TULARE	108 KERN	108 STANI SLAUS
Continuous emission monitors shall be capable of monitoring NOx levels to within 20% with confidence levels of 95% .				X	X				X
Continuous NOx monitors shall meet the applicable performance specifications in 40 CFR 51, App. P and 40 CFR 60, App. B, or equivalent as established by mutual agreement of the District, ARB, and EPA.	X	X	X			X	X	X	
Breakdowns must be reported within 48 hours, unless the source can prove that a longer period was necessary.	X (8 hrs)	X	X	X (immediate)	X	X	X	X	X
The District must be notified within 24 hours prior to shutdown of monitoring equipment for maintenance	X	X	X	X	X		X	X	X
Violations of any emissions standards of these rules, as shown by the stack monitoring equip., must be reported within 96 hours.	X	X	X	X	X		X	X	X
Quarterly reports are required.	X	X					X	X	
Records from the monitoring equipment shall be kept for at least two years.	X	X	X	X	X		X	X	X

The formula to calculate the relative accuracy in 40 CFR 60, Appendix B, includes a calculation of the “Confidence Coef.” (CC), which is a synonym for Confidence Interval as defined in standard statistics texts. Eqn. 2-3 in Appendix B uses the 95% confidence T-factor ($t_{0.975}$) to calculate CC. Therefore both App. B and the county SIP rules require 95% CI.

40 CFR 60 Appendix B, section 4.3 requires the CEMS relative accuracy (RA) be no greater than 20% of the reference method results (RM) in terms of the emissions standard or 10% of the applicable standard, whichever is greater. County SIP Rules for Fresno, Merced, and Stanislaus require that the accuracy of a CEMS be within 20%. The turbines qualifying to use the gas turbine templates are expected to have actual emissions, as measured by RM, close to the applicable standard of 15 - 42 ppmv NOx. Therefore, the performance specifications of District Rule 1080 are expected to be at least as stringent as those contained in the county SIP rules.

APPENDIX B

COUNTY RULE / DISTRICT RULE 1081 COMPARISON

APPENDIX B

Rule 1081 (Source Sampling)

REQUIREMENTS	1081 SJVUAPCD	108 KINGS	110 MADERA	108.1 FRESNO	108.1 MERCED	108.1 S.J.	108.1 TULARE	108.1 KERN	108.1 STANI SLAUS
Upon request of the APCO, the source shall provide info. and records to enable the APCO to determine when a representative sample can be taken.			X	X	X	X	X	X	X
The facility shall collect, have collected or allow the APCO to collect, a source sample	X	X	X	X	X	X	X	X	X
The source shall have District personnel present at a source test	X								
The applicable test method, if not specified in the rule, shall be conducted in accordance with 40 CFR 60, Appendix A	X								
Test procedures: 1) arithmetic mean of three runs 2) a scheduled source test may not be discontinued solely due to the failure to meet the applicable standard(s), and 3) arithmetic mean of two runs is acceptable if circumstances beyond owner or operator control occurs.	X								

APPENDIX C

PUC GAS SULFUR CONTENT STANDARDS

GENERAL ORDER 58-B
(Supplemental to General Order 58-A)

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

HEATING VALUE MEASUREMENT STANDARD FOR GASEOUS FUELS

Approved October 17, 1984. Effective November 16, 1984.
(Decision 84-10-052, CII 83-11-01)

Original Order Approved December 28, 1955--Effective January 17, 1956

It is ORDERED that the following rules be adopted effective November 16, 1984 to govern all gas corporations as defined in the Public Utilities Code,* in the determination of heating values of fuel gases. The order also is supplemental to General Order 58-A, which requires utilities to provide and maintain heating value measurement stations and shall not relieve any gas corporation from complying with the provisions of general Order 58-A.

7. Purity of Gas

a. **Hydrogen Sulfide**

No gas supplied by any gas utility for domestic, commercial or industrial purposes in this state shall contain more than one-fourth (0.25) grain of hydrogen sulfide per one hundred (100) standard cubic feet.

B. **Total Sulfur**

No gas supplied by any gas utility for domestic, commercial or industrial purposes shall contain more that five (5) grains of total sulfur per one hundred (100) standard cubic feet.

C. Test procedures used to determine the amounts of hydrogen sulfide and total sulfur shall be in accordance with accepted gas industry standards and practices.

D. When hydrogen sulfide, or total sulfur, exceeds the limits set forth in Section 7.a. and Section 7.b., the gas utility shall notify the Commission and commence remedial action immediately. The Commission shall be notified when the level of hydrogen sulfide, or total sulfur, has been reduced to allowable limits.

APPENDIX D

SOURCE TEST RESULTS (PM)

TABLE 1. SOURCE TEST RESULTS (PM)

Facility	Turbine Rating	Source Test Results (gr/scf)
Dynamis Turbine	30.0 MW	0.0018
Kingsburg Cogen	34.0 MW	0.0014
San Joaquin Cogen	48.6 MW	0.0006

APPENDIX E

TEMPLATE QUALIFICATION FORM
FOR
TEMPLATE # SJV-GT-1-1

Title V General Permit Template Qualification Form

District permit #_____

Please answer the questions in the table below. A gas turbine (unit) which meets the criteria of this table is qualified to use this template as part of a Title V application. To use this template, remove this sheet and attach to application.

Yes	No	Description of Qualifying Units
		Is the unit a General Electric Frame 7 with Quiet Combustor (Rule 4703)? If "no", continue to next question; otherwise STOP - you cannot use this template.
		To comply with the emissions limits of District Rule 4703, will NOx emissions from this unit be controlled by Selective Catalytic Reduction (SCR) **and** water or steam injection (Rule 4703)? If "yes"; continue to next question, otherwise STOP - you cannot use this template.
		Does the unit have a continuous emission monitoring system (CEMS) for NOx? If "yes", continue to next question; otherwise STOP - you cannot use this template.
		Does the unit have a heat input of at least 10 MMBtu/hr? If "yes", continue to next question; otherwise STOP - you cannot use this template.
		Is this unit fired on gas from coal gasification, landfills, or waste water treatment facilities? If "no", continue to next question; otherwise STOP - you cannot use this template.
		Is the unit fired exclusively on PUC-quality gas - natural gas with ≤0.017% sulfur by weight? If "yes", continue to next question; otherwise STOP - you cannot use this template.
		Is the unit operated exclusively for fire fighting and flood control? If "no", continue to next question; otherwise STOP - you cannot use this template.
		Does the unit operate more than 877 hours annually? If "yes", continue to next question; otherwise STOP - you cannot use this template
		Is the unit a laboratory unit used in research and testing for the advancement of gas turbine technology? If "no", continue to next question; otherwise STOP - you cannot use this template.
		Is the unit an emergency unit operating as a mechanical or electrical power source only when the primary power source for a facility has been rendered inoperable by an emergency situation? If "no", continue to next question; otherwise STOP - you cannot use this template.
		Did construction, modification, or reconstruction of the unit commence after 10/3/77(Subpart GG)? If "yes", continue to next question; otherwise STOP - you cannot use this template
		If the unit has a heat input at peak load ≥ 10 MMBtu/hr, but ≤ 100 MMBtu/hr, did you commence construction of the unit prior to 10/3/82?)? If "no", continue to next question; otherwise STOP - you cannot use this template
		If the unit is <u>not</u> an electric utility gas turbine (i.e. constructed for the purpose of supplying >1/3 of its power output capacity to any utility) and has a heat input at peak load greater than 100 MMBtu/hr did construction, modification, or reconstruction of the unit commence between 10/3/77 and 1/27/82(Subpart GG)? If "no", continue to next question; otherwise STOP - you cannot use this template
		Is the unit part of a stationary source where a new unit was operated for the first time on or after 1/30/96 and if so, is the generating capacity of the unit ≥ 25 MW? If "no", the unit has qualified to use this template; otherwise STOP - you may be an Acid Rain source, subject to Title IV of the CAA, and cannot use this template.

When must the unit meet the emissions limits of Rule 4703 as stated in the unit's compliance schedule submitted in compliance with District Rule 4703, sec.7.0? **COMPLIANCE DATE:** _____

Based on information and belief formed after reasonable inquiry 1) the information on this form is true and correct, 2) the facility certifies compliance with this template's permit conditions, and 3) the source will comply with the future effective requirements of this template on a timely basis:

_____ _____

Signature of Responsible Official Date

_____

Name of Responsible Official (Please print)